



## New names in *Heteropolygonatum* (Asparagaceae)

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### Abstract

*Heteropolygonatum* has been considered endemic to China, but molecular analyses and morphological observation of type and living collections necessitate the transfer of several *Polygonatum* to the former: *Heteropolygonatum alternicirrhosum*, *H. anomalum*, *H. marmoratum*, and *H. parcefolium*, which expands the range of the genus to neighboring Vietnam where *H. marmoratum* has been collected. Discussion of their morphology, perigone images, distribution, and full synonymy are given for the species transferred herein. Discussion of the distinctive generic morphology and karyotypes are provided in relation to their generic placement. Furthermore, the expansions of the provincial distributions of *H. ginfushanicum* and *H. roseolum* are given based on examination of herbarium material. A synoptic key to the genus is provided.

**Key words:** cytology, endemic, *Polygonatum*, Vietnam

### Introduction

During systematic studies on *Heteropolygonatum* Tamura & Ogisu in Tamura *et al.* (1997: 950) (Asparagaceae: Reveal & Chase 2011) and *Polygonatum* Miller (1754: without pagination) several species of *Polygonatum* were noted to have perigone morphology composed of imbricate tepals that ally them with the former genus. Preliminary molecular analyses of whole plastids and a limited number of nuclear loci from these species (A. Floden, in preparation) support the reciprocal monophyly of *Heteropolygonatum* and *Polygonatum* confirming that they are distinct. As a result this necessitates the inclusion of *Polygonatum anomalum* Hua (1892: 420), *P. alternicirrhosum* Handel-Mazzetti (1936: 1209), and *P. marmoratum* Lévillé (1909: 384) as members of *Heteropolygonatum*. These same data support the recent transfer of *H. altelobatum* (Hayata 1915: 229) Chao *et al.* (2013: 91). In addition to these species, *P. parcefolium* Wang & Tang (1949: 216) which is known from its type collection and one additional collection is also transferred to *Heteropolygonatum* based on examination of the type collection and paratypes. All of these except *P. alternicirrhosum* have resided under the morphologically dissimilar Himalayan *P. punctatum* Royle ex Kunth (1850: 142) (Chen & Tamura 2000). Although they have been synonymized in recent floristic treatments (Chen & Tamura 2000, Tang 1978), Jeffrey (1980) considered many of these distinct and considered them closely related to one another based on morphology which is corroborated by my own morphological comparisons and molecular data. *Heteropolygonatum* has also been considered to be endemic to China (Wu *et al.* 2007, Chen & Tamura 2000), but *H. marmoratum* has been collected from one site in Vietnam.

*Heteropolygonatum* is distinguished from *Polygonatum* by two distinctive features, though other morphological characters were utilized initially. The perigone in *Heteropolygonatum* is imbricate whereas the perigone in *Polygonatum* is valvate (Chen & Tamura 2000, Tamura & Ogisu 1997). Additionally, their base chromosome number is  $x = 16$  and is distinctly bimodal vs. the lower, although variable basic chromosome number and asymmetric karyotype in *Polygonatum*,  $x = 9–15$  (Deng *et al.* 2009, Tamura & Xu 2001, Yamashita & Tamura 2001, Chen & Tamura 2000, Tamura *et al.* 1997a–b). Pseudoterminal inflorescences were considered diagnostic for the genus but these are also observed in several *Polygonatum* species (Floden 2014). Other morphological characters formerly utilized were the ebracteate pedicels and/or peduncles, but all species of *Heteropolygonatum* thus far observed have distinct bracts that vary from subulate and persistent to caducous, and this shows the same range of variation seen in *Polygonatum* species. Dimorphic filament insertion was also utilized initially, but this feature was not consistent (Bao *et al.* 1998). Other morphological characters are shared among the known *Heteropolygonatum* species: pseudo-petiolate leaves distinctly

-	Stem ascending, 5–40 cm long; leaf blade lanceolate, oblong, ovate-oblong, or oblanceolate, 3.5–14 cm .....	3
3.	Stem and pedicels villosulous, hirtellous, or scabrellous, especially prominent in early growth .....	4
-	Stems and pedicels glabrous.....	6
4.	Perigone whitish-green.....	<i>H. marmoratum</i>
-	Perigone pink.....	5
5.	Inflorescences of individual flowers, rarely twinned .....	<i>H. anomalum</i>
-	Inflorescences of multiple flowers borne on peduncles .....	<i>H. parcefolium</i>
6.	Leaves 3–9; stem 10–40 cm long .....	7
-	Leaves 1–3(–4); stem 5–14 cm long .....	9
7.	Perigone pink or pink with green lobes; 11–16 mm long.....	8
-	Perigone greenish-white, 6–8 mm long.....	<i>H. altelobatum</i>
8.	Stem 20–40 cm long; leaves 6–9, shiny pale green abaxially, petiolate; perigone cylindric, 14–16 mm long, lobes green.....	<i>H. roseolum</i>
-	Stem 10–22 cm long; leaves 3–5, whitish abaxially, sessile; perigone campanulate, 11–13 mm long, lobes pink.....	<i>H. ogisui</i>
9.	Inflorescence 2–4-flowered; stem 5–14 cm long; leaves 1–4; perigone 6–8 mm long.....	<i>H. ginfushanicum</i>
-	Inflorescence 1-flowered; stem 5–35 mm long; leaf usually 1, rarely 2; perigone 9–12 mm long.....	<i>H. xui</i>

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